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Precision Prevention and Public Health

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Precision Prevention and Public Health

Abstract

A new trend, “Precision Prevention,” is emerging in public health. This term is borrowed from “Precision Medicine,” a concept in medicine that allows for individualized treatments for patients. Precision prevention utilizes “biologic, behavioral, socioeconomic, and epidemiologic data to devise and implement strategies” tailored to specific individuals or populations. The goal of precision prevention is to target the “right intervention to the right population at the right time.” Much of precision prevention accounts for one’s social determinants of health, tailoring interventions based on a set of individual factors related to where we live, learn, work, and play that impact our health. Precision prevention works to move away from universal approaches to illness and injury prevention.

Flaura Koplin Winston, MD, MPH, Chair of the Science and Medical Advisory Committee for Entrepreneurship and Innovation at The Children’s Hospital of Philadelphia (CHOP), applies a precision prevention framework, using a “tiered risk model” (see figure 1) for the Violence Prevention Initiative at CHOP. In the tiered risk model, there are three types of interventions focused around the needs of universal, selected, and indicated populations. At each level, interventions range from meeting the universal needs of the general population, to the select needs of populations at increased or different risk, and finally to interventions tailored for populations with adverse or indicated needs. For example, within the Violence Prevention Initiative, selected interventions that integrate appropriate community support services are tailored to children at greater risk for violence, and indicated interventions tailor the most intensive, direct support to child victims of violence.

Disciplines

Public Health

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PRECISION PREVENTION AND PUBLIC HEALTH

Written by Colleen McGrath with consultation from Graceann Palmarella, Sara Solomon, and Roxanne Dupuis

BACKGROUND

A new trend, “Precision Prevention,” is emerging in public health. This term is borrowed from “Precision Medicine,” a concept in medicine that allows for individualized treatments for patients. Precision prevention utilizes “biologic, behavioral, socioeconomic, and epidemiologic data to devise and implement strategies” tailored to specific individuals or populations¹. The goal of precision prevention is to target the “right intervention to the right population at the right time².” Much of precision prevention accounts for one’s social determinants of health, tailoring interventions based on a set of individual factors related to where we live, learn, work, and play that impact our health. Precision prevention works to move away from universal approaches to

illness and injury prevention.

Flaura Koplin Winston, MD, MPH, Chair of the Science and Medical Advisory Committee for Entrepreneurship and Innovation at The Children’s Hospital of Philadelphia (CHOP), applies a precision prevention framework, using a “tiered risk model” (see figure 1) for the Violence Prevention Initiative at CHOP. In the tiered risk model, there are three types of interventions focused around the needs of universal, selected, and indicated populations. At each level, interventions range from meeting the universal needs of the general population, to the select needs of populations at increased or different risk, and finally to interventions tailored for populations with adverse or indicated needs. For example, within the Violence Prevention Initiative, selected interventions that integrate appropriate

“While such universal injury prevention strategies can reach the widest audience, complementary targeted risk approaches are necessary to meet the needs of minority, higher risk populations, and to increase the value of prevention strategies.”

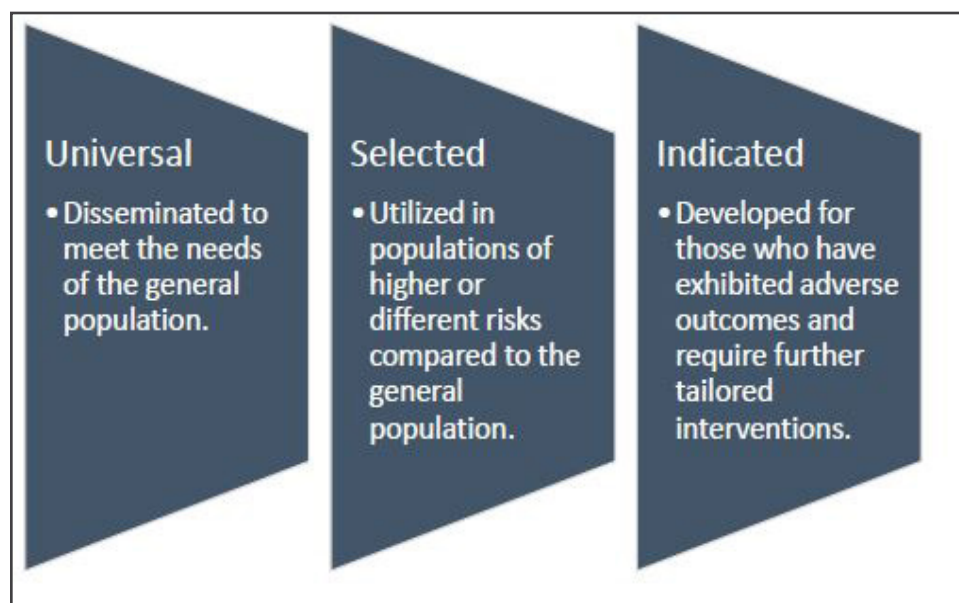
—CPHI Senior Fellow,
Flaura Koplin Winston, MD, MPH

community support services are tailored to children at greater risk for violence, and indicated interventions tailor the most intensive, direct support to child victims of violence.

PRECISION PREVENTION AND ADHD

Dr. Winston’s work in the field also includes motor vehicle crashes, with a specific focus on adolescents with Attention Deficit Hyperactivity Disorder (ADHD). CPHI Fellow Allison E. Curry, PhD, MPH, published an article alongside Dr. Winston and colleagues examining the crash risk among the ADHD adolescent and young adult population. They found that those afflicted by ADHD have a 36% higher risk of getting into a motor vehicle crash than those without ADHD³. The researchers found that six months following eligibility, the probability of licensure for adolescents with ADHD was 35% lower compared to their peers without ADHD. The authors call for further research relating to the effectiveness of prescription medications

Figure 1: Tiered Risk Model⁴



on reducing an individual's crash risk--taking into account medical adherence--and more research is needed to examine the effectiveness of parental monitoring and increased training.

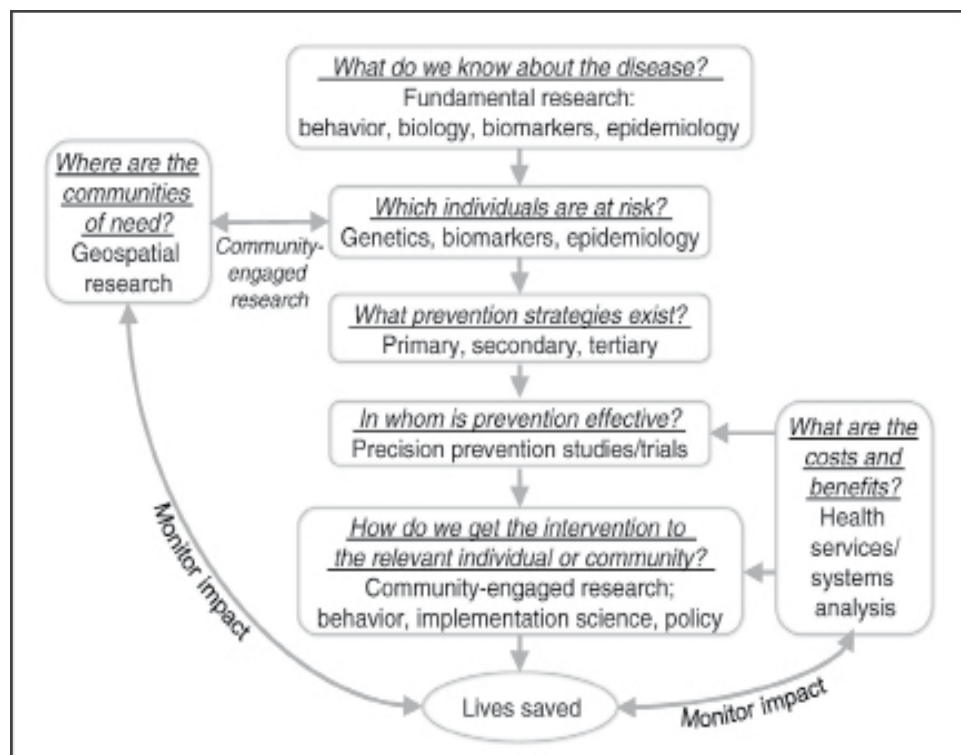
This study exemplifies a model case for precision prevention efforts. As demonstrated by the heightened crash risk, adolescents and young adults with ADHD are experiencing unique difficulties that are not apparent for other drivers. An example of a selected intervention for this population is in-vehicle monitoring and cognitive-behavioral therapy, which involves negotiation training and goal-setting⁴. Currently, it is not possible to conclude whether the increased crash risk is due to medication needs or adherence, or if the universal licensure process is not appropriate for this population. Regardless, it is apparent that a tailored intervention is needed to mitigate the risk of motor vehicle crashes in the ADHD adolescent and young adult population.

PRECISION PREVENTION AND CANCER

Precision prevention is increasingly important in cancer research, helping practitioners move beyond universal interventions to tailored ones for higher risk individuals. For example, in the case of prostate cancer screening, one common protocol involves the use of prostate-specific antigens followed by digital rectal examination³. However, this screening measure is not the most effective when applied universally, and unnecessary post-screening procedures are often required. Instead, a turn toward the precision prevention framework (see figure 2) would allow for individualized screening procedures that would screen more effectively and eliminate risky, unnecessary procedures. Other example instances where precision prevention could modify cancer interventions include²:

- » Knowing the speed with which individuals metabolize nicotine could lead to personalized smoking-cessation interventions
- » Increased screening protocol for individuals at high risk of cancer, based on genetic factors and family history
- » Preventive mastectomy for individuals testing positive for BRCA1 or BRCA2

Figure 2: Framework for precision prevention of cancer¹



PRECISION PREVENTION FRAMEWORK:

- ➔ Preliminary research on area of interest, including identification of risk factors and biomarkers
- ➔ Identify current prevention strategies
- ➔ Identify populations in need of tailored intervention
- ➔ Determine the areas of ineffectiveness in current preventive measures for each specific population
- ➔ Monitor the effectiveness of various tailored interventions

ABOUT CPHI

The Center for Public Health Initiatives was founded in 2007 by the University of Pennsylvania to act as an interdisciplinary public health center that brings together faculty, staff, and students from across Penn's campus. The mission of CPHI is to educate and train new and emerging public health leaders, foster multi-disciplinary collaborations, and promote excellence in public health research and community partnerships.

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